



Conserve O Gram

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Protecting Wood With Preservatives And Water Repellants

Wooden objects exhibited outdoors, such as farm implements, wagons, cannon carriages, and furniture, should be kept under shelter whenever possible. This greatly reduces loss of wood from rot and protects wood from the harmful effects of moisture, direct sunlight, and ultraviolet radiation. Any wooden object placed outdoors without protection from sunlight, dew, rain, or snow will deteriorate more rapidly than a protected one. It is, in effect, being used consumptively. The outdoor environment subjects unprotected wood to alternate swelling and drying, to increased risk of insect attack, and, in high relative humidity situations, to the possibility of mold or fungal attack.

Wheels or other wooden parts should not come in direct contact with a dirt floor or with the ground, but should be placed on bricks, concrete blocks, or blocks made of wood treated with a wood preservative. An additional moisture barrier of thin polyethylene may be placed between the object and the top of the block. This barrier also may be used on cement or wooden floors.

Unsheltered objects, in areas with little risk of high relative humidity, insect, or fungal attack, should be treated with a non-toxic water repellent. When such risks are high, objects can be treated with both a wood preservative and a water repellent containing a mildewcide. This *Conserve O Gram* provides guidance on water repellent and preservative mixtures that can be applied by park staff. The preservative mixtures can be applied to wood in lieu of an additional finish, or before painting. They should not be applied to historic objects housed indoors or fully sheltered from the outdoor environment.

The application of some preservatives or water repellants may slightly darken the wood, and when applied to the bare areas of previously painted objects, does require prior removal of flaking paint. In some cases, remnants of these original finishes are salvageable, remain an important part of the object's character, or provide information about the piece that must at least be recorded. Consult a wood conservator and the Regional Curator if any questions arise concerning the decision to apply these mixtures to objects.

Safety Precautions

Some preservative and water repellent mixtures are pesticides and their use requires advance approval by the NPS Integrated Pest Management (IPM) Coordinator. Both the water repellent and the preservative mixtures require caution in use. Obtain Material Safety Data Sheets for all products (see *Conserve O Gram* 2/1) and carefully follow all safety precautions on the sheets and on the product containers, including adequate ventilation and use of protective clothing. It is recommended that all water repellents and preservatives be applied outdoors, preferably under shelter.

Preparation

To prepare wood for the application of either a water repellent or a preservative, remove loose dirt and paint and rotted wood with a stiff bristle brush or air compressor,¹ being careful not to remove surface detail. Hardware can be left in place.

The Borate Preservatives

A recent advancement in wood preservatives in the United States is the use of borates which have been used in Europe, Australia, and New Zealand since the 1940s. Borate is a generic term for compounds containing the elements boron and oxygen. Boron does not occur alone naturally, but as calcium and sodium borate ores. Borates offer effective protection against wood boring beetles, subterranean and dry wood termites, and brown and white decay fungi. At this time, borate preservatives appear to be the safest and most effective protection treatment available when applied properly.

Advantages of Borates

One of the big advantages of sodium borates is that, although toxic to decay fungi and insects, they are only minimally toxic to humans and other mammals. Borates are odorless, do not vaporize, and do not discolor wood. Structural properties of the wood are not affected, and metal fasteners, such as nails, screws, and braces, with the exception of aluminum, are not corroded. When high enough concentrations are used, the treated wood is also fire resistant. Paints and water repellants can be applied over borate-treated wood. Borates can be applied by brush, with a garden sprayer, by injection, or by dipping. Equipment can be cleaned with warm water. Wash water and any left-over solution is considered non-toxic waste.

Disadvantages of Borates

Because borates are water soluble, they may leach out from treated wood that is exposed to frequent wetting. To control leaching, a good water repellant can be applied over the borate treated wood. Borates have herbicidal properties in high concentrations and can be toxic to some plants; therefore precautions should be taken to protect grass and plants when working outdoors. Borates are not effective in controlling mold and mildew.

Commercial Borate Preservatives

Bora-Care™ is a product that is effective in penetrating seasoned wood as would be found in historic objects. It is available as a liquid concentrate that must be diluted at least one to one with water. The concentrate consists of sodium borates and ethylene glycol. It can be applied easily with a brush or garden sprayer. Two coats should be applied for complete diffusion through the wood.

Tim-Bor® is a powdered borate that requires a mixture of 90% water (one pound of Tim-Bor to one gallon of water). It is more effective in diffusing through green or unseasoned wood than through old or seasoned wood. It also can be applied by spraying, with a brush, by injection or by dipping. Two coats should be applied for good penetration.

Impel® rods, a combination of borax and boric acid with the water removed, are solid, fused borate cylinders. When inserted into wood they will suppress existing decay and prevent future fungal growth. When the moisture content rises to 20% to 25% in the wood, the rods begin to dissolve and the borate diffuses into the wood, killing decay fungi and providing future protection against fungal attack. Drilling holes in the wood to accommodate the rods is required; therefore, in most circumstances, Impel rods are not to be used on historic objects. However, they can be used on reproduction artifacts.

Other Commercial Wood Preservatives

Preservatives containing toxic substances such as creosote, pentachlorophenol, or inorganic arsenicals have been used for some time to protect exterior surfaces. Because of regulatory changes made by the Environmental Protection Agency and the National Park Service, these types of preservatives can no longer be applied on site by NPS personnel. Some other less toxic wood preservatives, available from paint and hardware stores, are listed below.

<u>Preservative Type</u>	<u>Example Product</u>	<u>Paintable</u>	<u>Average Effective Life</u>
Zinc naphthenate	Cuprinal®	Yes	2-3 yrs
	Clear #20		
	Red Devil®	No	2-3 yrs
	Clear WP		
Copper-8-quinolinolate	Woodguard®	Yes	8 yrs
Polyphase	Magicolor®	No	8 yrs
	Natural WP		
	Zar® Clear WP	Yes	3 yrs

All of the commercial preservatives above require prior IPM approval. Contact the Regional IPM Coordinator and the Regional Curator to initiate this process.

Commercial Water Repellants

To prevent leaching of the water-soluble borates, a good water repellent can be applied to treated objects that are exposed to the elements. Two newly developed products have performed well in tests conducted by the National Park Service, Division of Conservation, Harpers Ferry Center. These water repellants can be applied by brush or with a hand sprayer. For best results when spraying, use a low-pressure sprayer with a fan tip.

Co-Pel™ is a clear water repellent specifically designed for use with diluted Bora-Care. It is formulated with paraffin wax and styrene acrylic latex in a co-polymer gel water system. Co-Pel is applied along with the second application of Bora-Care, thus saving one step. It is an effective water repellent, but it does not contain a mildewcide.

Where the growth of mold and mildew on the surface of the artifact may cause a problem, it is preferable to choose a water repellent with a mildewcide. X-100 Natural Seal® is a paraffin

oil-based water repellent containing Busan® which is a highly effective, low-toxic mildewcide.

Note

1. In certain cases, deteriorated wood may be consolidated with epoxy; treatment should be determined and performed by a wood conservator.

Sources

Bora-Care, Impel Rods, and Co-Pel water repellants are available from the following distributors: Preservation Resource Group, P.O. Box 1768, Rockville, MD 20849-1768, (301) 309-2222; Van Walters & Rogers, Inc., 9733 Coach Road, Richmond, VA 23237, (804) 264-0870.

Tim-Bor is available from the following distributors: Van Walters & Rogers, Inc.; Conservation Services, 8 Lakeside Trail, Kinnelon, NJ 07405, (201) 838-6412; United States Borax and Chemical Corporation (manufacturer), 3075 Wilshire Blvd., Los Angeles, CA 90010, (213) 391-8600.

X-100 Natural Seal Clear Water Repellent is available from: American Building Restoration Chemicals, Inc., 9720 South 60th Street, Franklin, WI 53132, (800) 639-8180.

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